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PRICE AND GESS

ATTORNEYS AT LAW

2100 S.E. MAIN STREET, SUITE 250

IRVINE, CALIFORNIA 92614-6238

JOSEPH W. PRICE
ALBIN H. GESS
MICHAEL J. MOFFATT
GORDON E. GRAY III
BRADLEY D. BLANCHE
J. RONALD RICHEBOURG

OF COUNSEL
JAMES F. KIRK

A PROFESSIONAL CORPORATION
TELEPHONE: (949) 261-8433
FACSIMILE: (949) 261-9072
FACSIMILE: (949) 261-1726

e-mail: pg@pgpatentlaw.com

COPY OF AMENDMENT UNDER ART. 34

Inventor(s): Junichi Hibino et al.

Title: A DISPLAY AND MANUFACTURING METHOD FOR
THE SAME INCLUDING IMPROVED BONDING AGENT
APPLICATION METHOD

Attorney's
Docket No.: NAK1-BO16

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AMENDMENT

TO: Commissioner of the Patent Office

1. Identification of the International Application

PCT/JP99/04855

2. Applicant (Common Representative)

Name: MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

Address: 1006, OazaKadoma, Kadoma-shi, Osaka 571-8501 Japan

Country of nationality: Japan

Country of residence: Japan

3. Agent

Name: NAKAJIMA SHIRO

Shiro Nakajima

Address: 6F, Yodogawa 5-bankan, 2-1, Toyosaki 3-chome, Kita-ku,

Osaka-shi, Osaka 531-0072 Japan

4. Date of Invitation 18. 08. 00

5. Item to be Amended

(1) Description

(2) Claims

6. Subject Matter of Amendment

As per the attached sheet

(1) The Description is amended as follows.

The expression '(6.65 104 Pa)' is inserted following '500 Torr' on page 2, line 13.

The expression '(6.65 104 Pa)' is inserted following '500 Torr' on page 2, line 18.

The expression '(1.01 105 Pa)' is inserted following '760 Torr' on page 2, line 20.

The expression '(1.33 105 Pa)' is inserted following '1000 Torr' on page 2, line 20.

The expression '(1.01 105 Pa)' is inserted following '760 Torr' on page 3, line 1.

The passage 'a bonding agent layer forming step for forming a layer of a paste-like bonding

agent having an even surface over a substrate having an even surface; and
a connecting step for simultaneously bringing a top of each barrier rib down into contact with the bonding agent layer, while regulating a distance between the upper surface of the bonding agent layer and the barrier ribs.

A display panel manufacturing method may further include an application process for applying a bonding agent to a plurality of barrier ribs formed on at least one of a pair of substrates, and a connection process for arranging the pair of substrates in opposition and connecting the pair of substrates together via the bonding agent that has been applied to the barrier ribs. The application process includes a bonding agent layer forming step for forming a layer of a paste-like bonding agent having an even surface so as to embed a position regulating member that regulates positions of the barrier ribs within the layer, the position regulating member being arranged on a substrate having an even surface; and a connecting step for bringing a top of each barrier rib down into contact with the position regulating member to apply the bonding agent simultaneously to the tops of all of the barrier ribs while regulating a distance between the upper surface of the bonding agent layer and the barrier ribs.

Furthermore, a display panel manufacturing method may include an application process for applying a bonding agent to a plurality of barrier ribs formed on at least one of a pair of substrates, and a connection process for arranging the pair of substrates in opposition and connecting the pair of substrates together via the bonding agent that has been applied to the barrier ribs. The application process includes a bonding agent layer forming step for forming a layer of a paste-like bonding agent having a curved surface so as to embed a position regulating member that regulates positions of the barrier ribs within the layer, the position regulating member being arranged on a substrate having a curved surface; and a connecting step for bringing a part of each barrier rib top down into contact with the position regulating member, and then to move the position regulating member along a length of the barrier ribs to apply the bonding agent to the tops of all of the barrier ribs while regulating a distance between the upper surface of the bonding agent layer and the barrier ribs.' is inserted following 'The application process includes...' on page 5, line 6.

The expression 'In this invention' on page 5, line 15 is amended to 'In this way, the invention aligns'.

The expression 'are aligned' on page 5, line 16 is deleted.

The passage 'Here, the bonding agent applying process includes a first step for arranging the substrate on which the barrier ribs are formed and the bonding agent in opposition, with a gap between the barrier rib tops and the bonding agent; and a second step for regulating the degree of contact between the barrier rib tops and the bonding agent by controlling the distance between the barrier ribs and the bonding agent.

This enables the distance between the bonding agent and the barrier rib tops to be appropriately regulated, allowing the amount of bonding agent attached to the barrier rib tops to be easily controlled.

Here, the bonding agent applying process includes a third step for placing the substrate on which the barrier ribs are formed and the bonding agent in opposition, with a gap between the barrier rib tops and the bonding agent; a fourth step for bringing one part of each barrier rib into contact with the bonding agent by controlling the distance between the barrier ribs and the bonding agent to a distance at which the bonding agent is applied to the barrier rib tops as a result of surface tension; and a fifth step for bringing the surface of the bonding agent and virtually the entire surface of each barrier rib top into contact by altering the relative positions of the bonding agent and the barrier ribs while maintaining the distance between the barrier ribs and the bonding agent to a distance at which the bonding agent continues to be applied to the barrier ribs as a result of continuing surface tension.

This enables the distance between the bonding agent and the barrier rib tops to be appropriately regulated, allowing the amount of bonding agent attached to the barrier rib tops to be easily controlled.

Here, the bonding agent applying process further includes a sixth step for placing

the substrate on which the barrier ribs are formed, and the bonding agent in opposition, with a gap between the barrier rib tops and the bonding agent; and a seventh step for bringing the barrier ribs into contact with the bonding agent using a regulating means for regulating the position of the barrier rib tops in relation to the bonding agent.

The bonding agent is applied to the barrier rib tops by bringing the barrier rib tops into contact with a regulating device for regulating the position at which the barrier rib tops touch the bonding agent. This enables the degree of contact between the bonding agent and the barrier rib tops to be easily regulated, allowing the amount of bonding agent applied to the barrier rib tops to be simply controlled.

Here, the bonding agent applying process further includes an eighth step for altering the relative positions of the bonding agent and the barrier ribs with the barrier rib tops in contact with the regulating means.

This enables the bonding agent to be attached to the barrier rib tops without any irregularities.

Here, the bonding agent holding member is a rotating object on whose surface the bonding agent is held; and the bonding agent applying process includes a ninth step for bringing the bonding agent into contact with virtually the entire surface of the barrier rib tops by rotating the bonding agent holding member to move the point of contact between the bonding agent and the barrier rib tops along the length of the barrier ribs.

When the panel is mass-produced, this enables the bonding agent to be applied efficiently to the barrier rib tops, without halting the movement of the production line.' on page 7, line 15 to page 9, line 22 is deleted.

The passage 'Here, the relative positions of the barrier ribs and the bonding agent can be altered while keeping the barrier ribs in contact with the bonding agent layer. This enables the bonding agent to be applied more evenly to the barrier rib tops.' is inserted prior to The bonding agent should preferably be..' on page 9, line 23.

The passage 'The bonding agent is held by a regulating means. This enables the degree of

contact between the bonding agent and the barrier rib tops to be more appropriately controlled.' on page 9, line 25 to page 10, line 1 is deleted.

The expression 'regulating means' on page 10, line 5 is amended to 'position regulating member'.

The expression 'regulating means' on page 10, line 6 is amended to 'position regulating member'.

The expression 'of the bonding agent holding member' on page 10, line 7 is amended 'a flat substrate'.

The passage 'or may be composed of a plurality of half-cylinders, the barrier rib tops being brought into contact with the curved surface of the half-cylinders.' is inserted following 'a flat substrate' on page 10, line 7.

The passage '...are brought into contact by using a pattern forming member with the same pattern to form the pattern for the barrier ribs and the bonding agent.' on page 12, lines 4 to 6 is amended to '...are aligned by forming the pattern for the barrier ribs and the bonding agent simultaneously.'

The passage 'for forming a...' to 'pattern forming process.' from page 11, line 22 to page 12, line 2 is amended to 'including a first step for laminating the barrier rib forming material and the bonding agent by forming layers of certain thicknesses; a second step for simultaneously pressing down the laminated barrier rib forming material and bonding agent using a same pattern member to form the specific pattern; and a third step for transferring a molded pattern formed in the barrier rib forming material and bonding agent to the substrate on which the barrier ribs are to be formed.'

The passage 'Here, the barrier rib pattern forming process and the bonding agent pattern forming process include a first step for laminating the barrier rib forming material and the bonding agent by forming layers of certain thicknesses; a second step for simultaneously pressing down the laminated barrier rib forming material and bonding agent using a same pattern-forming member to form the specific pattern; and a third step for transferring a molded pattern formed in the barrier rib forming material and bonding agent to the substrate on which the barrier ribs are to be formed.

This enables the pattern of the barrier ribs and the bonding agent to be formed simultaneously using the same pattern-forming member having the same pattern for forming the barrier ribs and the bonding agent. The barrier rib tops and the bonding agent can thus be more accurately aligned than when the method was restricted only to using the same pattern to form the barrier ribs and the bonding agent. In addition, the bonding agent can be applied evenly along the narrow barrier rib tops using a simple technique, even if the barrier rib tops are not strictly linear, and form wavy lines. This produces a display panel with greater bonding strength.' from page 12, line 13 to page 13, line 7 is deleted.

The expression 'on a top of each barrier rib' on page 13, line 23 is amended to 'in a centre of each barrier rib top, when viewed widthwise'.

The expression 'the central area of' is inserted following '...advance in...' on page 14, line 2.

The expression 'a first member' on page 15, line 14 is amended to 'a bonding agent positioning member'.

Page 15, lines 15 to 19 are amended to 'removing process for removing parts of the bonding agent positioning member attached to the barrier rib tops at positions corresponding to the specific pattern, to form a groove along each barrier rib top; a bonding agent filling process for filling the grooves with the bonding agent, while maintaining the relative positions of the grooves and the barrier rib tops; and a second removing process for

removing the remaining bonding agent positioning member.'

Page 16, lines 4 to 5 are amended to 'barrier rib tops by the bonding agent positioning member, until the bonding agent positioning member is removed.'

The expression 'first member' on page 16, line 6 is amended to 'bonding agent positioning member'.

The expression 'first member' on page 16, line 8 is amended to 'bond agent positioning member'.

Page 16, lines 9 and 10 is amended to 'The first removing process removes parts of the bonding agent positioning member attached to the barrier rib tops by irradiating the surface of the bonding agent positioning member with a laser.'

Page 16, lines 11 to 14 'The laser irradiation is controlled according to measurements taken to locate the barrier ribs. This enables the parts of the first member adhering to the barrier rib tops to be removed accurately.' are deleted.

Page 16, lines 18 to 20 'A photoresist may be used as the first member; and the first removing process form holes by irradiating the first member in a specific pattern and then developing the first member.'

Page 17, lines 11 to 16 are amended to 'includes an arranging process for bringing an already formed bond sheet into contact with tops of the barrier ribs; a transfer process for transferring the bonding agent to the parts of the barrier rib in contact with the bond sheet by pressing the bond sheet onto the barrier rib tops; and a removing process for separating the bond sheet from the barrier ribs.'

Page 18, lines 18 to 20 are amended to 'of each barrier rib; a hardening process for selectively hardening parts of the attached bonding agent positioned in a central area of the barrier rib tops, when viewed widthwise; and a removing process for removing the parts of the bonding agent that have not been hardened.'

Page 18, lines 3 to 5 'The transfer process may transfer the bonding agent to the parts of the barrier rib tops in contact with the bond sheet by pressing the bonding agent sheet onto the barrier rib tops.' is deleted.

The expression 'central' is inserted following 'barrier rib tops.' on page 18, line 24.

The expression 'central' is inserted following 'in the hardening process' on page 19, line 13.

The expression 'first' is deleted from page 19, line 24.

The expression 'first' is deleted from page 19, line 26.

The expression 'via a bonding agent' is inserted following 'at least partially connected' on page 20, line 15.

The expression ' $(1.01 \times 10^5 \text{ Pa})$ ' is inserted following '760 Torr' on page 22, line 16.

The expression ' $(1.01 \times 10^5 \text{ Pa})$ ' is inserted following '760 Torr' on page 31, line 8.

The passage 'A photoresist method may be used as an alternative method for establishing apertures in a film to apply the bonding agent selectively to the tops of the barrier ribs' on page 62, lines 10 to 12 is deleted.

The expression ' $(8.11 \times 10^5 \text{ Pa})$ ' is inserted following '6100 Torr' on page 68, line 13.

(2) The Claims are amended as follows.

Claim 1, lines 8 to 15 are amended.

Claim 2 is amended.

Claim 3 is amended.

Claim 4 is amended.

Claim 5, line 2, 'Claim 4' is amended to 'one of Claims 1 and 2'.

Claim 5, line 4, 'regulating means' is amended to 'the bonding agent'.

Claim 6 is canceled.

Claim 7, line 2, 'Claims 1 to 5' is amended to 'Claims 1 to 4'.

Claim 7, line 3 'for a same substrate' is deleted.

Claim 8 is canceled.

Claim 9 is canceled.

Claim 10 is canceled.

Claim 11 is canceled.

Claim 12, line 1 'of Claim 4' is amended to 'one of Claims 2 and 3'.

Claim 13, line 1 'of Claim 4' is amended to 'one of Claims 2 and 3'.

Claim 13, line 4, 'bonding agent member' is amended to 'flat substrate'.

Claim 14, line 1 'of Claim 4' is amended to 'one of Claims 2 and 3'.

Claim 14, line 2 'regulating means' is amended to 'position regulating member'.

Claim 15, line 2 'of Claims 1 to 5, Claims 8 and 10, and Claims 12 to 14' is amended to 'any one of Claims 1 to 4'.

Claim 16 is canceled.

Claim 17 is canceled.

Claim 18 is canceled.

Claim 19 is canceled.

Claim 21, lines 6 to 13 are amended.

Claim 22 is canceled.

Claim 24, line 7 is amended to 'indentation in a centre of each barrier rib top, when viewed widthwise'.

Claim 27, lines 7 to 14 are amended.

Claim 28 is amended.

Claim 29 is amended.

Claim 30 is canceled.

Claim 32 is canceled.

Claim 33 is canceled.

Claim 34 is canceled.

Claim 35 is amended.

Claim 36, lines 6 to 8 are amended to 'an arranging process for bringing an already formed bond sheet into contact with tops of the barrier ribs'

The expression 'by pressing the bond sheet onto the barrier rib tops' is inserted in Claim 36, line 10.

Claim 37 is canceled.

Claim 38, line 2 '37' is amended to '36'.

Claim 39, lines 9 to 11 are amended.

Claim 43, line 2 is amended to 'Claims 1, 2, 3, 4, 20, 24, 27, 36, and 39'.

Claim 44, line 11 is amended by inserting the expression 'via a bonding agent'.

Claim 52, lines 2 and 3 '760 Torr' is amended to ' 1.01×10^5 Pa'.

Claim 57 line 5 '760 Torr' is amended to ' 1.01×10^5 Pa'.

Claim 58, line 4 '760 Torr' is amended to ' 1.01×10^5 Pa'.

Claim 59 line 6 'first substance' is amended to 'substance'.

7. List of Attached Documents

(1) Amendment under Article 34

46 sheets